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# MEMOIRS OF THE DEPARTMENT OF AGRICULTURE IN INDIA

## LIFE-HISTORIES OF INDIAN INSECTS MICROLEPIDOPTERA

### II. CARPOSINIDÆ, PHALONIADÆ, TORTRICIDÆ AND EUCOSMIDÆ

BY

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# MEANING OF THE
# DECASTHALLY OF AGRICULTURE
# IN INDIA

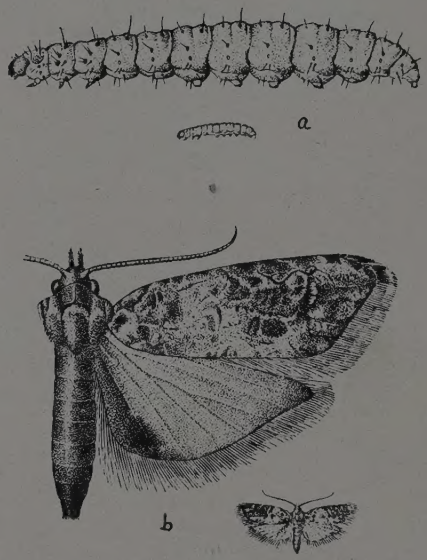


*Fig.* 1. *Carposina reprobata*:—*a*, Larva; *b*, moth, natural sizes and magnified.

**Fig. 2.** ***Acroclita vigescens***:—Moth; natural size and magnified. Below is seen a more enlarged view of the head from the side.

# LIFE-HISTORIES OF INDIAN INSECTS. MICROLEPIDOPTERA.

## II. CARPOSINIDÆ, PHALONIADÆ, TORTRICIDÆ AND EUCOSMIDÆ.

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## CARPOSINIDÆ.

### MERIDARCHIS SCYRODES, MEYR.

*Meridarchis scyrodes*, Meyrick, Exot. Micr., II, 30 (Oct., 1916) (1); Fletcher, Entl. Note No. 74 (1916)(2); Proc. Second Entl. Meeting, p. 254 (1917)(3).

Reared at Coimbatore "in February from larvæ living in fruits of *Zizyphus jujuba* (Rhamnaceæ)" (1) and has also been bred from *Zizyphus jujuba* fruit at Pusa in March and April(2). Also reared at Nagpur and Surat from *Zizyphus* fruits.

### MERIDARCHIS REPROBATA, MEYR. MS. (PLATE VIII, FIG. 1.)

This species has been reared at Nagpur and Surat from larvæ in fruits of *Eugenia jambolana*. We have also reared it from olive fruits sent to us from Kashmir by Messrs. Mitchell & Co., in October 1917. The larva is about 10 mm. long and about 1·5 mm. across fifth abdominal segment, thence tapering towards either extremity (when the larva is at rest the hinder part of the abdomen appears very stout—see figure), dorsally pink, ventrally pale yellow; head yellow-brown, glossy; prothoracic shield large, longitudinally divided in middle, slightly darker than head; skin of body soft, glossy; tubercles brown chitinized spots bearing single rather long thin hairs; five pairs of equally developed prolegs. Moths emerged from these larvæ (at Pusa) between 19th November and 3rd December. (Pusa Insectary Cage-slip 1724.)

## PHALONIADÆ.

### CLYSIA AMBIGUELLA, HB.

*Tinea ambiguella*, Hubner, Tin., 153 (1801)(1).

*Clysia ambiguella*, Meyr., Handbk., pp. 556-557 (1895)(2); Wlsm., A. M. N. H. (7) V, 488 (1900)(3); Kennel, Pal. Tortric, iii, 240, t. 11 f. 45 (1913)(4).

Larva "pale brownish-yellow; head and plate of 2 black"(2). A well-known and very injurious pest of the vine in Europe, the larva feeding in the flower-buds. Not yet noted as a pest in India, though it is known to occur in Assam (Cherrapunji; Naga Hills), N. Manipur, and Pegu (Karen Hills).

### PHALONIA HYBRIDELLA, HB.

*Tinea hybridella*, Hubner, Tin., 351(1).

*Phalonia hybridella*, Meyr., Handbk., p. 553 (1895)(2); Wlsm., A. M. N. H. (7) V, 486 (1900)(3); Kennel, Spuler's Schmett. Eur., II, 258, t. 84 f. 30(4).

Larva "pale pink; head light brown; plate of 2 yellowish, with four black dots; in seed heads of *Picris hieracioides*"(2).

A palæarctic species, recorded from Dharmsala(3). It is doubtful whether it is really Indian.

### PHALONIA MANNIANA, F.R.

*Cochylis manniana*, Fischer v. Rosl., Abbild., p. 134, t. 51 f. 2(1).

*Phalonia manniana*, Meyr., Handbk., p. 549 (1895)(2), Rec. Ind. Mus., V, 217(3), P. Linn. Soc. N. S. W., XXXVI, 297 (1911) (4); Spuler, Schmett. Eur., II, 258, t. 84 f. 32.(5).

Larva in *Mentha* and *Lycopus*(5) in Europe.

This species has been recorded from India and Ceylon, extending to N. Australia(4), but in a later note Mr. Meyrick (Ent. Mo. Mag., 1916, 277-278) notes that the above record(4) is incorrect, the species in question being *P. mellita*, Meyr., whose early stages are as yet unknown.]

## TORTRICIDÆ.

### CAPUA INVALIDANA, WLK.

*Tortrix invalidana*, Wlk., Cat., XXVIII, 327 (1863)(1); Moore, Lep. Ceylon, III, 493 (1887)(2).

*Epagoge invalidana*, Meyr., B. J., XVIII, 617 (1908) (3).

*Capua invalidana*, Fletcher, Proc. Second Entl. Meeting, p. 300 (1917)(4).

Originally described from Ceylon(1), this species has since been recorded from Coorg and the Khasi Hills(3), and was reared at Nagpur in December 1915 from larvæ feeding on betel-vine leaves.

ADOXOPHYES PRIVATANA, WLK.

*Dichelia privatana*, Wlk., Cat., XXVIII, 320 (1863)(1).

*Adoxophyes privatana*, Wlsm., A. M. N. H. (7) V, 481-482 (1900) (2); Meyr., Gardiner's Fauna Geogr. Maldives, I, 126 (1902)(3), Proc. Linn. Soc. N. S. W., XXXV, 209 (1910)(4), Entom. Mitteil. Suppl., III, p. 47 (1914)(5).

Originally described from Moulmein, this species is very widely distributed in India, Burma and Ceylon and from Korea to New Guinea.

We have it from Coimbatore, Kallar (Nilgiris), Sidapur (Coorg) and Manantoddy (Wynaad).

This species has been bred at Coimbatore by Y. Ramachandra Rao from larvæ found in *Lantana* flowers. No description of the larva was recorded, but pupation took place in a folded leaf.

The pupa is 8 mm. long and 2 mm. broad, cylindrical, truncated anteriorly, anal segment conical, terminating in a flattened spatuloid chitinized process bearing four pairs of recurved hooks ; light translucent yellow, surface rather shiny. The wing-covers extend to the middle of the ventral surface of fourth abdominal segment. Dorsal surface of abdominal segments with three transverse ridges especially developed on fourth and succeeding segments, first ridge close to anterior margin and sharply excised, second ridge adjacent to first and carrying a row of sharp, short but rather stout spines, ranging from twelve to twenty in number, third ridge slightly behind middle of segment, sharp but with its edge broken into numerous close-set denticles.

A larva which pupated on 26th December 1916, emerged on 2nd February 1917, and a second larva which pupated on 26th-27th December 1916, emerged on 3rd-4th February 1917. Y. Ramachandra Rao (*Lantana* Cage-slip 21).

HOMONA COFFEARIA, NIETN.

*Tortrix coffearia*, Nietn., Obs. Enemies Coffee Tree in Ceylon, p. 24 (1861)(1).

*Homona fasciculana*, Wlk., XXVIII, 425(2).

*Tortrix coffearia*, Moore, Lep. Ceylon, III, 494 (1887)(3).

*Homona coffearia*, Fletcher, S. I. I., p. 452, f. 330 (1914) (4), Proc. Second Entl. Meeting, pp. 20, 28 (1917)(5).

"*Homona coffearia* is widely distributed throughout the tea districts of North-East India and has occasionally occurred in sufficient numbers to be noted by planters and specimens have on one or two occasions been received at the laboratory of the Indian Tea Association from managers of tea gardens, generally in Assam. Speaking generally, however, this insect is of comparatively little importance as a pest of tea in these parts.

"There are two periods of the year at which the caterpillars are most conspicuous, *viz.*, March to May and August to September. They attack the topmost leaves of a [tea] shoot and the damage done in the early part of the season, though seldom serious, is greater than that done later in the season, for the following reason. The pest prefers succulent growth, and on this account will attack indigenous varieties of tea, on which the young leaves are soft and juicy, in preference to China or hybrid varieties, in which the young leaves tend to be more dry. Similarly, the new growth on cut-back tea is more succulent than that on tea which has been top-pruned, and hence bushes pruned in the former manner are more liable to attack than top-pruned bushes. Should a cut-back bush be backward in its growth in March it is very liable to receive a very severe check if attacked by this pest, more especially so, as the rule at this time of year is to pluck such tea to a measure, leaving all bushes untouched which have not yet grown up to that measure. Should a shoot be attacked after reaching that measure, the damage done is negligible, as the pest and the attacked leaves are removed by the pluckers, and the main object, which was to allow the new shoots to attain a certain growth, has been achieved. In August and September, however, such conditions do not obtain. The main object then (for August and September are the two months during which growth is most rapid as a rule) is to get the leaf off. The caterpillars are removed by the pluckers almost as soon as they become established and only a small proportion attain maturity.

"Thus ordinary garden operations as a rule exercise a sufficient check on the pest and, in cases where backward cut-back tea is affected in the early part of the season, it is now made a practice of plucking the affected tops off the shoots even if they have not attained the growth desired. The highest axillary bud then develops, and the shoot is afterwards left until it attains the desired measure.

"Specimens of the different pests of tea are continually being collected in the field and reared in this laboratory in the hope of finding parasites, but so far no parasites have been found to attack *Homona coffearia*." (E. A. Andrews, *in litt.*, 17th January 1917.)

*Homona coffearia* was recorded (4) as a tea-pest in the tea districts of Southern India on the authority of Mr. R. D. Anstead, and I have no first-hand knowledge of its occurrence on tea in Southern India at all. Probably it does occur, together with *Laspeyresia leucostoma* and perhaps other species. Specimens of *Homona coffearia*, taken at Pollibetta in South Coorg by myself, had probably bred upon coffee, as there was no tea near by. It has

also been reared in Southern India by Y. Ramachandra Rao from larvæ found feeding on *Lantana* at Kallar (Nilgiris) and Sidapur (Coorg).

HOMONA MENCIANA, WLK.

*Pandemis menciana*, Wlk., Cat., XXVIII, 310 (1863) (1).
*Godana simulana*, Wlk., Cat., XXXV, 1801 (1866) (2).
*Tortrix pullatana*, Snell., Tijds. voor Ent., XLIV, 68–69, t. 5 ff. 3,3*a* (1901) (3).
*Capua menciana*, Wlsm., A. M. N. H. (7) V, 482-483 (1900) (4).
*Homona menciana*, Meyr., T. E. S., 1910, 432 (5).

Originally described from Shanghai, *H. menciana* has since been recorded from Japan, China, India, Java, Borneo, Celebes, Timur, Batian, and the Moluccas. In India it has been found at Cherrapunji(4), in the Naga Hills(4) and in Sikkim(4), and we have it from Shillong and Darjiling and also from Southern India.

*Homona menciana* has been bred in Southern India by Y. Ramachandra Rao from larvæ folding tips of branches of *Lantana camara* at Kallar and webbing flowers and leaves on tip of a *Lantana* branch at Sidapur, Coorg.

The Kallar larva, when about to pupate, was described as 12 mm. long, cylindrical, rather stout, pale greenish to pale yellowish, posterior extremity rather dark green ; head shiny black ; prothoracic shield rather lighter than head with a conspicuous narrow pale anterior margin ; shields on body rather large, circular, shiny, bearing rather long, slender hairs ; legs and prolegs normal. It pupated on 3rd January and a female moth emerged on 10th January 1917.

The Sidapur larva was described as 19 mm. long, cylindrical, slightly flattened, brownish-green, with sparse greyish-green hairs ; head small, flattened, reddish yellow, prothoracic shield greenish brown with a dark brown marginal line laterally and posteriorly but not anteriorly. It pupated on 18th May and the moth emerged on 25th May 1917.

Pupa (from Kallar larva) 12 mm. long and 3·5 mm. broad, reddish or yellowish brown, cylindrical, rather stout, blunted anteriorly, wing-sheaths barely reaching middle of dorsal surface of fourth abdominal segment, anal segment produced into a long blunt chitinized projection. Abdominal segments with three transverse dorsal ridges, first plain and sharply excised posteriorly, second composed of a row of strongly developed spines, third composed of a row of numerous smaller spines (which, however, are not so small or so numerous as in *Lobesia*). (Y. Ramachandra Rao's *Lantana* Cage-slip 33 and un-numbered slip dated 13th May 1917.)

CACŒCIA MICACEANA, WLK.

*Cacœcia micaceana*, Wlk., XXVIII, 314 (1863)(1); Moore, Lep. Ceylon, III, 492, t. 208 f. 1 (1887)(2).

Occurs throughout India, Burma and Ceylon. The larva has been found on guava and broad bean at Mandalay (K. D. Shroff coll.). We have also moths from Minbu (Lower Burma) and from Peshawar.

CACŒCIA EPICYRTA, MEYR.

*Cacœcia epicyrta*, Meyr., B. J., XVI, 589 (1905) (1), T. E. S., 1910, 432 (2).

Originally described from Ceylon, this species has since been found in India and Java. In India it is widely distributed and we have it from Madulsima, Maskeliya, the Shevaroys, the Palnis, Coimbatore, Pusa, Solan and Darjiling.

At Coimbatore it has been bred from a larva on *Duranta* fruits, and at Pusa from a larva boring a guava fruit.

*Cacœcia epicyrta* has been bred in Southern India on several occasions by Y. Ramachandra Rao from larvæ found on *Lantana camara*. The larva webs up adjacent flower-heads and feeds on the corollas, etc., as a rule, but is sometimes found also on shoots or on ripe fruits, which latter it webs up and feeds on their dried pulp and bores into the seeds but in most cases without injuring the embryos. It has been found on *Lantana camara* at Coimbatore, Kallar, Bangalore, Sidapur, Manantoddy and Yercaud.

A larva 8 mm. long is described as dark grey, slightly hairy, head shiny yellowish-brown, prothoracic shield shiny dark-brown. This larva was found on 21st November 1916, and moulted on 24th-25th November, after which it was 12 mm. long, dark grey, rather hairy, the hairs arising from whitish wart-like shields, head shiny yellow-brown, prothoracic shield very dark brown anteriorly edged with light brown. On 29th November it was 17·5 mm. long; on 30th November it prepared a cocoon and pupated on 1st December, the moth emerging on 9th December 1916.

The larva is occasionally greenish or brown, and the head may be reddish-brown.

The pupa is about 10·5 mm. long and 3 mm. broad, reddish-brown dorsally, yellowish ventrally, with the wing-sheaths reaching the fourth abdominal segment. Third and succeeding abdominal segments with three transverse dorsal ridges, first sharp and medially indented posteriorly to form a sharp angle, second ridge composed of four to eight rather large short spines, third ridge forming a posterior row of small, close-set, stout spines. The anterior

spineless medially recurved ridge is rather characteristic of the pupa of this species. (Y. Ramachandra Rao's *Lantana* Cage-slip 5.)

This species has also been reared at Pusa from larvæ sent from Solan in January 1916, as attacking orange leaves.

### CACŒCIA ISOCYRTA, MEYR. MS.

A single larva was found at Pusa on 7th January 1917, in a rolled-up top of a lucerne plant, some of the top leaves being cut and dried and rolled up together. The moth emerged on 15th February. (Pusa Insectary Cage-slip 1914.)

### CACŒCIA PENSILIS, MEYR. MS.

A single specimen was reared from a larva found boring into an orange fruit at the base of the stem ; the fruit was purchased in Madras City, but was probably brought from some other locality in Southern India.

### CACŒCIA COMPACTA, MEYR.

*Cacœcia compacta*, Meyr., Exot. Micr., II, 164-165 (1918)([1]).

Bred at Pusa in February-March 1916, from larvæ found webbing up *Salix* leaves and feeding under cover of the webbing on the epidermis and mesophyll tissue of the leaves. The larvæ were collected on 29th February, when they were about half-grown and pupated between 21st and 27th March, the moths emerging from 26th March to 6th April 1916. Pupation took place within folded leaves, in a slight cocoon formed of white silken threads.

The half-grown larva is about 10 mm. long and 1 mm. broad, cylindrical, dull green with scattered short pale-greenish hairs, head shiny yellowish-brown, prothoracic shield black and strongly chitinized.

The full-grown larva is about 20 mm. long and 2 mm. broad, head pale brown, otherwise as above.

The pupa is about 10 mm. long and 2·5 mm. broad across the thoracic region, cylindrical, tapering posteriorly, anal segment produced and terminating in a pair of short aciculate processes, brown, darker dorsally and lighter ventrally with a slight green tinge over ventral thoracic region. (Tahl Ram's Cage-slip 170.)

### CACŒCIA DISPILANA, WLK.

*Pandemis dispilana*, Wlk., XXX, 983 (1864) ([1]).

*Cacœcia dispilana*, Meyr., Cat. Tortric., p. 18 (1912) ([2]).

*Archips mimicus*, Wlsm., Swinh. Cat. Het. Oxf. Mus., II, 573 (1900) ([3]).

The larva is recorded([3]) by Minchin, from examples found at Ootacamund, as "green, head brown, slightly hairy. Leaf-roller on honey-suckle. Pupa brown."

The moth occurs throughout India (? except the North-West) from the Nilgiris and Wynaad to Bhutan and Assam and in Burma to Mergui. We have it from Shillong and Cherrapunji.

CACŒCIA PHILIPPA, MEYR.

*Cacœcia philippa*, Meyr., Exot. Micr., II, 165 (1918)(1).

"Bred at Abbottabad from larva on *Hedera*, June (Fletcher) (1)."

ULODEMIS TRIGRAPHA, MEYR.

*Ulodemis trigrapha*, Meyr., B. J., XVII, 736 (1907)(1), B. J., XXII, 771 (1914)(2).

This species was originally described from Bhutan(1) and later recorded from the Khasi Hills(2). We have it from Darjiling and Shillong. At Shillong it was reared in October 1916, from a larva found feeding on the berries of an unidentified jungle shrub (? *Viburnum* sp.).

PANDEMIS RIBEANA, HB.

*Tortrix ribeana*, Hb., Samml. Eur. Schm., f. 114 (1800)(1).

*Pandemis ribeana*, Meyr., Handbk., p. 533 (1895)(2); Wlsm., A. M. N. H. (7), V, 386 (1900)(3); Kennel, Pal. Tortric., p. 157, t. 8 ff. 21, 22 (1910)(4).

This insect is a palæarctic species which occurs in North and Central Europe, Central Asia, the Himalayan Region, China, Korea, and Japan.

The larva feeds in more or less spun-up leaves of *Cratægus*, *Rosa*, *Prunus*, *Pyrus*, *Quercus*, *Rhamnus*, *Fraxinus*, *Sorbus*, *Acer*, *Tilia*, *Betula*, *Ribes*, *Berberis*, *Geum*, etc. It is described by Meyrick as "light green; dorsal line darker; head green, sometimes brown-spotted; plate of 2 green (2)."

TORTRIX SEMIALBANA, GN.

*Cacœcia semialbana*, Guenee, Ann. S. E. Fr., 1845, p. 139(1); Kennel, Pal. Tortric., pp. 142-143, t. 7 f. 45 (1910)(2).

*Archips semialbanus*, Wlsm., A. M. N. H. (7) V, 383-384 (1900)(3).

Larva on *Lonicera*, *Rosa*, *Chelidonium*, *Labium*, *Urtica*, etc.(2)

Another palæarctic species, which occurs along the Himalayan region from Kashmir to Sikkim. We have it from Dungagali (Hazara District; 8,000 feet) and Kasauli.

TORTRIX DUMETANA, TR.

*Tortrix dumetana*, Treitschke, Schmett. Eur., X (3), p. 160 (1835)(1); Meyr., Handbk., p. 538(2); Wlsm., A. M. N. H. (7) V, 451 (1900)(3); Kennel(3), Pal. Tortric., pp. 193-194, t. 10 f. 12 (1910)(4).

Larva in leaves or spun-up shoots of *Lonicera, Valeriana, Urtica, Sanguisorba, Origanum, Dictamnus, Hedera, Thalyctrum, Rubus, Umbelliferæ* and *Quercus*[4].

A palæarctic species, recorded[3, 4] from Kashmir.

HARMOLOGA MISERANA, WLK.

*Teras miserana*, Wlk., XXVIII, 301 (1863)[1].

*Harmologa miserana*, Meyr., P. Linn. Soc. N. S. W., XXXV, 270 (1910)[2], Entom. Mitteil., Suppl. No. III, p. 48 (1914)[3].

"Larva rather slender, cylindrical, with scattered whitish hairs; grey-whitish, posteriorly ochreous-tinged; two brownish-ochreous spots placed longitudinally on back of each segment; lateral line moderately broad, reddish-fuscous; head dark-fuscous; segment 2 whitish, posteriorly tinged with ochreous, posterior angles suffusedly blackish: feeds between joined leaves of *Ficus benjamina* and another *Ficus* not identified, rolling up a corner for shelter, in August (and doubtless most of the year); pupation in same position[2]."

The above description is from Australian examples. The insect occurs in Australia, Java, Formosa and Assam.

CNEPHASIA ARGENTANA, CL.

*Phalæna argentana*, Clerck, Icones 11, 14[1].

*Tortrix argentana*, Meyr., Handbk., p. 542[2]; Kennel, Pal. Tortric., pp. 196-197, t. 10 ff. 17, 18[3]; Wlsm., A. M. N. H. (7) V, 460[4]; Durrant, P. Z. S., 1906, 498[5].

Recorded to occur in N.-W. India[3], Kashmir (7,000-13,000 ft.)[3, 4, 5] and Sikkim (15,000 ft.)[5].

PLANOSTOCHA CUMULATA, MEYR.

*Cacœcia cumulata*, Meyr., B. J., XVII, 977 (1907)[1].

*Planostocha cumulata*, Meyr., Exot. Micr., I, 13 (1912)[2], Wytsm. Gen. Ins. Tortric., p. 50, t. 3 f. 45 (1913)[3].

This species, originally described[1] from Ceylon and Coorg, we have from the Nilgiris, Sidapur (Coorg) and Yercaud (Shevaroy Hills).

At Sidapur it was reared from *Lantana camara* by Y. Ramachandra Rao, but no description of the early stages seems to have been made.

EBODA OBSTINATA, MEYR.

*Eboda obstinata*, Meyr., B. J., XVIII, 624 (1908)[1], Exot. Micr., I, 20 (1912)[2].

The larva is described[2], from Pusa records, as "slightly tapering posteriorly, green, with a lateral row of whitish hairs; subdorsal line

indistinct, whitish; head yellow-green, in rolled leaves of *Cardiospermum* (Sapindaceæ)."

The moth is recorded from India (Pusa), Ceylon (Puttalam), Mauritius, the Comoro Islands, and S. Africa. We have it from Pusa only.

The larva either rolls a single leaf of *Cardiospermum* sp. (Hindi *Banchatail*) or spins together two or three leaves, inside which it hides and feeds on the leaves. It is about 12 mm. long, cylindrical, slightly tapering posteriorly, with two lateral rows of whitish hairs and an indistinct whitish subdorsal line running from mesothorax to anal segment; thoracic legs slender, pointed; prolegs short, the anal pair directed posteriorly. When about to pupate, the subdorsal line becomes more distinct and changes in colour from white to bay; it extends from first to eighth abdominal segments; the dorsal area between these lines becomes a brighter bay colour; the eighth and ninth abdominal segments with two bay-coloured lateral dots.

Pupation takes place within a rolled leaf. The pupa is 6 mm. long tapering posteriorly, reddish-brown, wings green.

Larvæ were found at Pusa on 9th August, 1907. Pupation commenced on 13th August and the moths emerged between 20th and 24th August 1907. (A. Mujtaba's Cage-slip 30.)

### PERONEA SIDEROTA, MEYR.

*Peronea siderota*, Meyr., Exot. Micr., II, 171 (1918)(1).

"Bred at Peradeniya in December from larva mining in twigs of *Cinnamomum camphora* (Rutherford)(1)."

### PERONEA EPIDESMA, LOW. (PLATE IX.

*Polylopha epidesma*, Lower, Tr. Roy. Soc. S. Austr. (1901) 71(1).
*Oxygrapha porpacias*, Meyr., B. J., XVIII, 625 (1908)(2).
*Peronea epidesma*, Meyr., P. Linn. Soc. N. S. W., XXXV, 292-293 (1910)(3).

Recorded from Australia(1, 3), Siam(2) and Ceylon.(2, 3). We have a long series from Pusa.

The larvæ have been found at Pusa on 29th October 1911, and 15th September 1917, rolling and binding together tender leaves of *Polyalthia longifolia* (Hindi *Asokh*). On the latter date they were found in very large numbers and were noted as doing considerable damage.

The larva is about 15 mm. long, rather flattened, tapering slightly towards either extremity, brownish grey sometimes with a greenish or dark tinge. Head shining pale yellow speckled with black. Prothoracic shield as head with a black collar-like bar posteriorly. Hairs as shown in figure d, their

*Peronea epidesma*:—*a*, Leaf of *Polyalthia longifolia* rolled by larva; *b*, larva; *c*, male pupa; *d*, female pupa; *e*, male moth; *f*, female moth; natural sizes and magnified.

bases slightly tubercular. Spiracles rounded, narrowly ringed with brown. Tracheal tube white, thread-like, visible along line of spiracles. Five pairs of equally developed prolegs with hooklets disposed in a circle.

Pupation takes place in a thin white silken cocoon lining a rolled leaf. Before emergence, the pupa wriggles out to some extent through one end of the cocoon.

The pupa is from 8 to 10 mm. long, slightly compressed dorso-ventrally, tapering posteriorly, yellow brown. Abdominal segments with transverse rows of short spines bordering anterior margin and preceding posterior margin. The male pupa is longer than that of the female, the eighth and succeeding abdominal segments being elongated to accommodate the long anal claspers of the male moth. Anal segment without special armature but provided with a few thin circinate hairs.

From larvæ collected on 15th September 1917, moths emerged between 24th September and 5th October 1917, and between 22nd and 28th November 1911, from larvæ collected on 29th October 1911. (Pusa Insectary Cage-slips 920, 1703.)

[PERONEA SCHALLERIANA, LINN.

*Tortrix schalleriana*, Linn., Faun. Suec. No. 1339 (1761)(1).
*Tortrix comparana*, Hb., Samml. Eur. Schm., VII, t. 46, f. 284 (ante 1813)(2).
*Oxygrapha comparana*, Wlsm., Swinh. Cat. Het. Oxf. Mus., II, 572 (1900)(3).
*Peronea schalleriana*, Meyr., Cat. Tortric., p. 62 (1912)(4).

This is a European species, recorded(4) from North and Central Europe and Maine. Lord Walsingham has recorded it(3) from Ootacamund, where the larva is stated to be very common, rolling up rose leaves ; this is doubtless an error, perhaps for *extensana* Wlk., and *schalleriana* should be removed from the Indian list pending further evidence.]

## EUCOSMIDÆ.

### SPILONOTA RHOTHIA, MEYR.

*Spilonota rhothia*, Meyr., T. E. S., 1910, 368(1), Exot. Micr., I, 33 (1912)(2).

Originally described from Mauritius, India (Pusa) and Ceylon (Maskeliya)(1). Widely distributed in India. We have it (or I have seen specimens) from Pusa, Nagpur, Balaghat (C. P.), Coimbatore and Koilpatti.

Larva on *Psidium guava*(1). Described from Pusa records, it is cylindrical, slightly tapering posteriorly, bright orange ; head flattened, yellow ; spots yellow-whitish, with very fine white hairs ; segments constricted transversely in middle ; in rolled terminal portions of leaves of *Eugenia jambolana* (Myrtaceæ)(2).

This species was reared at Pusa at the end of March 1916, from small larvæ found on tender leaves of *Eugenia jambolana* on 10th March. One specimen of *Polychrosis cellifera* was also reared with these, but the larvæ were not distinguished. (Dwarka Prasad Singh's Cage-slip dated 10th March 1916.)

At Nagpur this species was said to have been reared from "balsam" and at Koilpatti it has been reared from a larva feeding on tender mango leaves.

ACROCLITA CHERADOTA, MEYR.

*Acroclita cheradota*, Meyr., B. J., XXI, 856(1).

*Strepsipleura cheradota*, Lefroy, Ind. Ins. Life, p. 540 (1909)(2).

Larva feeding in rolled leaves of *Ficus religiosa* at Pusa(1, 2). Also recorded from Puttalam, in Ceylon(1). We have specimens from Pusa and Coimbatore, in both cases bred from larvæ on leaves of *Ficus religiosa*, but no description of the larva seems to have been made. It has also been reared at Pusa from a larva found on *Ficus glomerata* in a gall caused by *Pauropsylla depressa*; the larva was found on 25th December 1916, and emerged on 14th January 1917.

ACROCLITA NÆVANA, HB.

*Tortrix nævana*, Hubner, Tortric., 261(1).

*Eudemis nævana*, Meyr., Handbk., p. 477 (1895)(2).

*Rhopobota nævana*, Wlsm., A. M. N. H. (7), VI, 441 (1900)(3); Kennel, Spuler's Schmett. Eur., II, 273, t. 85 f. 43(4).

*Acroclita nævana*, Meyr., B. J., XXI, 857 (1912)(5).

Larva light grey-brown, sides more yellowish; head black or blackish-brown; plate of 2 black; on blackthorn, holly, *Vaccinium*, etc.(2).

Occurs throughout India and Ceylon; also in Europe and Japan. We have this from the Khasi Hills, where it is common, but it has not been reared in India.

ACROCLITA VIGESCENS, MEYR. MS. (PLATE VIII, FIG. 2.)

This species has been reared at Pusa from pupæ found on 9th March 1916, on leaves of *Cordia myxa* and from larvæ found on 15th April 1916, joining together leaves of *Cordia latifolia*. The larva was described as pale brownish slightly tinged with green; head brown with brown mouthparts. The pupæ were found on either side of the leaf; in some cases the cocoon consisted of fine whitish silken threads only, in others blackish pellets of excrement were attached to the silk. On emergence of the moth the chestnut-brown pupa is protruded out of the cocoon. The moths emerged in

March and April. (C. S. Misra's Cage-slip dated 9th March 1916, and Ram Saran's Cage-slip dated 15th April 1916.)

ANCYLIS GLYCYPHAGA, MEYR.

*Ancylis glycyphaga*, Meyr., Exot. Micr., I, 32 (1912)(1).

The larva, described from Pusa records, is subcylindrical, yellow, head flattened ; feeds on the sugary excretion of *Phromnia marginella* (Homoptera) ; pupa in a white cocoon(1).

In January 1910, a number of living nymphs of *Phromnia marginella* was received and with them a few leaves which were covered with a thick, hard, dry crust of their sugary excretion. All of these were placed on a living *ber* (*Zizyphus jujuba*) plant and covered with a field-cage and later on these caterpillars were found in a hibernating condition inside their cocoons ; as all the caterpillars were found in the midst of the sugary excretion, which bore marks of having been nibbled, it was supposed that they had fed upon it. One of the caterpillars was parasitized by a dipterous grub which emerged from its host's pupa and then pupated inside the cocoon alongside this pupa.

The full-grown larva is about 15 mm. long, sub-cylindrical, segments distinct, integument soft, yellow ; head shiny yellow, flattened ; prothoracic shield large, yellow ; mesothoracic and metathoracic regions dark ; body with sparse thin hairs ; prolegs equally developed.

Pupation takes place in a white silken cocoon formed either in cracks in the crust of sugary *Phromnia* excretion on a leaf or on a leaf, preferably in a corner.

Pupa about 8 mm. long, brown, with two transverse rows of minute backwardly-directed spines on dorsal region of abdominal segments ; anal extremity rather blunt with several thin hairs with recurved tips around apex. The pupa emerges from the cocoon to some extent before the exit of the adult. (Pusa Insectary Cage-slip 821.)

We also have this from Abbottabad.

ANCYLIS CARPALIMA, MEYR.

*Ancylis carpalima*, Meyr., P. Linn. Soc. N. S. W., XXXVI, 244 (1911)(1), B. J., XXI, 861 (1912)(2).

Common in India and Ceylon, also occurring in Queensland(1).

ANCYLIS LUTESCENS, MEYR.

*Ancylis lutescens*, Meyr., Exot. Micr., I, 32 (1912)(1).

The larva, as described from Pusa records, is cylindrical, tapering posteriorly, greenish, towards extremities yellowish, with short scattered whitish

hairs ; head rosy-yellowish ; second segment with shining yellow semicircular lobes at anterior angles, not meeting dorsally ; in rolled leaves of *Zizyphus jujuba* (Rhamnaceæ) ; pupa in cocoon in same position(1).

Larvæ were found at Pusa on 26th September 1907, rolling up *ber* (*Zizyphus jujuba*) leaves and feeding on the epidermis of the upper surface of the rolled leaf, the lower surface of leaf (external surface of rolled portion) not being eaten. Young green leaves may also be eaten from the edge or in holes, but dry or partially dry leaves are not eaten.

Young larva about 9 mm. long, cylindrical, tapering posteriorly ; light green, rather transparent, the visceral contents visible through the skin, anteriorly and posteriorly yellowish ; head shiny yellowish with a rosy tinge ; prothorax with shining yellow semicircular protuberant lobes at anterior angles, not meeting dorsally, with two lateral setigerous tubercles and smaller hairs on dorsal area ; abdominal segments distinct, with whitish dorsal and lateral hairs, the latter projecting outwards ; prolegs dull white. Full-grown larva about 30 mm. long, with irregular alternately brownish and light-green stripes along the back and sides.

The larva rolls up the edge of a leaf by means of silken threads and lives in the hollow thus formed within a thinly woven white silken network. It pupates in this chamber.

Pupa about 8 mm. long, cylindrical, blunt anteriorly, brown, abdominal segments dorsally with submarginal transverse rows of indented lines, first row behind anterior margin, second row before posterior margin and composed of finer indented lines than first row ; cremastral hooks six in number, in two rows of three each. The anterior third of the pupa is protruded from the cocoon for emergence of the moth, the posterior extremity being attached to interior of cocoon by the cremastral hooks. The pupal period is seven days in October. Larvæ found on 26th September, emerged from 7th to 23rd October 1907. (Pusa Insectary Cage-slip 607.)

We have this from Pusa, Hoshangabad and Gauhati. It has also been bred at Pusa from larvæ in galls on *ber* branches and from a larva boring in *Blumea*.

### ANCYLIS CYANOSTOMA, MEYR.

*Ancylis cyanostoma*, Meyr., Exot. Micr., II, 16-17 (Oct. 1916)(1).

" Bred at Pusa in January from larvæ feeding in spun leaves of *Zizyphus jujuba* "(1).

Larvæ rolling up *ber* (*Zizyphus jujuba*) leaves and collected at Pusa on 26th December 1915, emerged between 27th January and 14th February 1916, one of the resultant moths being *Ancylis lutescens* and the rest

*A. cyanostoma.* No description of the early stages seems to have been taken. (Tahl Ram's Cage-slip 130.)

DIPLONEARCHA INSINUANS, MEYR.

*Diplonearcha insinuans*, Meyr., Exot. Micr., I, 274-275 (1914)(1).

Reared from Psyllid gall on *Ficus* at Peradeniya(1).

EUCOSMA CRITICA, MEYR.

*Eucelis critica*, Meyr., B. J., XVI, 587 (1905)(1); Lefroy, Ind. Ins. Pests, p. 143 (1908)(2), Ent. Mem. Dept. Agric. India, I, 221(3), Ind. Ins. Life, p. 530, t. 55 (1909)(4); Fletcher, S. Ind. Ins., p. 450, t. 39 (1914)(5), Proc. Second Entl. Meeting, pp. 12, 42 (1917)(6).

*Eucosma ludicra*, Meyr., B. J., XXI, 867 (1912)(7).

*Eucosma trichocrossa*, Meyr., Exot. Micr., I, 563-564 (1916)(8).

*Laspeyresia trichocrossa*, Fletcher, Entl. Note 76 (1916)(9).

This polynomial species, originally described(1) from specimens bred from larvæ in spun-up shoots of *Cajanus indicus* at Surat, has since been recorded* from North Coorg(7), Southern India(5) and Pusa(9) and it probably occurs throughout the Plains of India. We have it from Pusa, Surat and Coimbatore. Hitherto it has only been noticed to attack *Cajanus indicus*, of which it is a minor pest, the larva rolling and webbing together the top-leaves of its foodplant and also eating into flower-buds and boring into pods and devouring the seeds. At Pusa this species is active from March to May and again from August to October, hibernating in the larval state. The following is a summary of the life-history as noted at Pusa :—

The egg is elongate with rounded ends, about 0·5 mm. long and 0·25 mm. in diameter. When laid it is of a creamy white with a greenish tinge but later on turns yellow and small reddish patches, usually forming two interrupted reddish longitudinal markings, appear on its surface. Eggs are laid at night and singly ; when several are laid close to one another they are usually placed in a row. They may be laid on any part of the foodplant—on the upper or lower surfaces of leaves, on petioles of leaves, or on the stem—but a groove or depression is always preferred as a suitable place for oviposition ; thus, on the upper surfaces of leaves most eggs will be found on a midrib or vein whilst on lower surfaces of leaves they will be found placed beside a midrib or vein, and the grooves of petioles or peduncles are very favourite places. A female moth, which emerged on 5th October, laid in confinement

* It has also been recorded from other localities (*e.g.*, Nagpur and Raipur) but it is doubtful how far some of these records really refer to *E. critica*.

26 eggs on 7th, 34 on 8th, 29 on 9th, 13 on 10th, and died on 11th October, having laid 102 eggs in all. Of these 102 eggs, 31 were laid on the stem, 21 on the grooves of petioles or peduncles of leaves, 26 on the upper and 24 on the lower surfaces of leaves. The egg-stage lasts about three days, the larva gnawing a hole at one end and bursting open the egg-shell longitudinally. The empty egg-shell is not eaten.

The newly-hatched larva is about 1 mm. long, cylindrical, tapering slightly posteriorly, uniformly yellow, with five pairs of fully developed prolegs; head black, shiny, larger than following segments; prothoracic shield small, shining dark brown. The larva changes but little in colour as it grows.

The full-grown larva is about 10 mm. long, cylindrical, slightly tapering towards either extremity, yellowish, with a few scattered hairs on each segment; head smaller than prothorax, shiny yellow, somewhat compressed, mouthparts brown, with two small black spots laterally and a third near antenna, ocelli arranged in a crescent; prothoracic shield shiny, brownish yellow; legs yellow; spiracles rounded, rimmed with brown.

The larva on hatching usually comes to the tender top-leaves if it does not happen to have emerged there. When these leaves are still in a folded state, it burrows into one of them and feeds from within. If the leaves have already unfolded, it begins to gnaw a midrib and the adjacent tissue on the upper surface of a leaf and soon hides itself under a very thin transparent, gummy stuff, to which dust-like gnawed particles of the leaf remain attached and which stretches over the midrib and larva onto the two halves of the leaf; it works upwards until the two halves of the leaf become folded together. During its whole life, the larva remains hidden, whether feeding on leaves, flowers, or pods. As it grows it brings together almost all the top-leaves of a shoot or of adjacent shoots and binds them together in a crumpled mass, within which it feeds and lives. These spun top-shoots are fairly conspicuous and their removal is indicated as a means of control. At Pusa hibernation takes place in the larval state, as full-grown larvæ, collected from the fields on 7th January, lived in spun-up leaves until 18th February, when the first pupated and emerged as a moth on 6th March.

Pupation takes place in a thin, papery, whitish, silken cocoon which usually lines a hollow space within a crumpled mass of spun leaves. It may, however, be placed inside a flower-bud or within a few dried flower-petals rolled together or, when the larva has fed in a seed-pod, inside the pod, in which case a hole of exit is prepared for the moth, this hole being covered with silk and frass. Before emergence, the pupa wriggles out of the cocoon for about half its length. The pupal period is about four to six days.

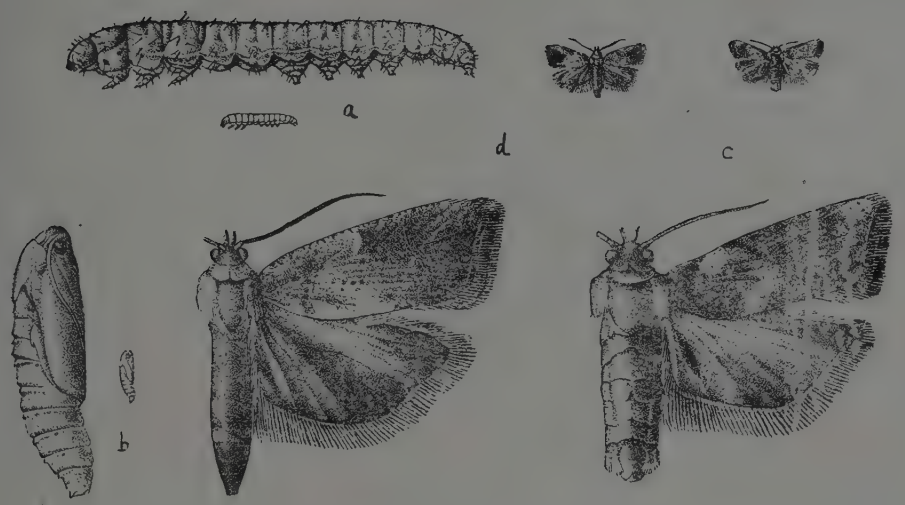



Fig. 1. *Eucosma melanaula*:—*a*, Larva; *b*, pupa; *c*, male moth; *d*, female moth; natural sizes and magnified.

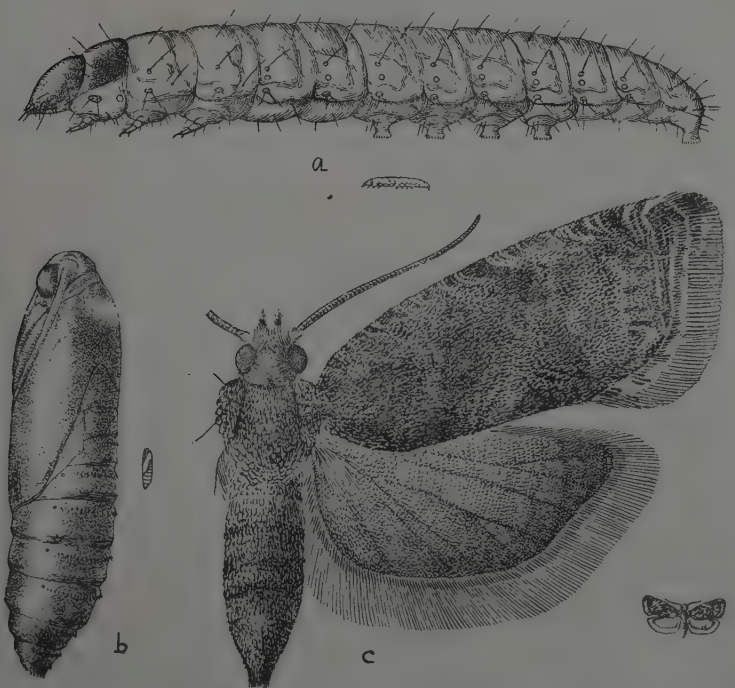
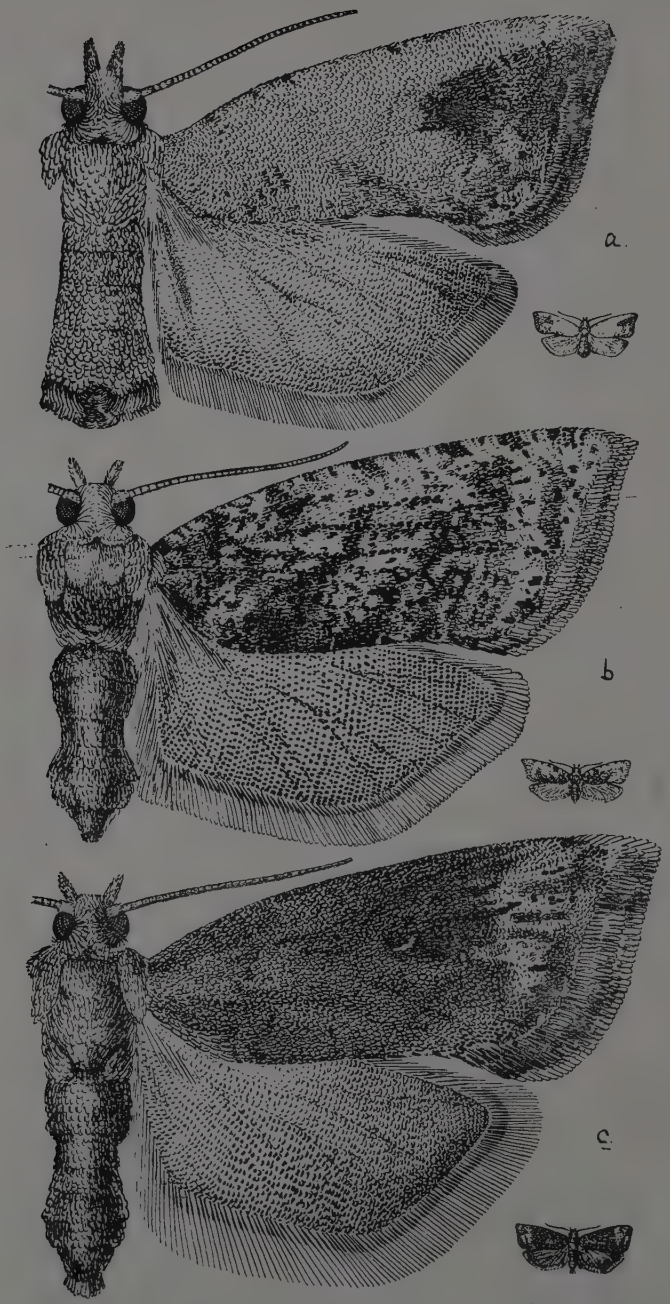



Fig. 2. *Eucosma conciliata* :—*a*, Larva ; *b*, pupa ; *c*, moth, natural sizes and magnified.




*Eucosma melanaula.*—Three varieties of Moth (x 10):—*a*, male; *b*, and *c*, females. (Note black glandular patch on hind wing of male.)

The pupa is about 6 mm. long, tapering posteriorly, but rather blunt at anal extremity, yellow brown; abdominal segments dorsally with a row of small embossed points transversely across their anterior portion; anal segment with six white cremastral hairs.

The life-cycle is shown in the following table :—

| Eggs | | Larvæ pupated | Moths emerged | To duration |
|---|---|---|---|---|
| Laid | Hatched | | | |
| 23 August . . | 26 August . . | 8 September . | 14 September . | 22 |
| 11 September . | 14 September . | 27 September . | 2 October . | 21 |
| 12 September . | 15 September . | 28 September . | 3 October . | 21 |
| 14 September . | 17 September . | 30 September . | 4 October . | 20 |

EUCOSMA MELANAULA, MEYR. (PLATE X, FIG. 1; AND PLATE XI.)

*Eucosma melanaula*, Meyr., Exot. Micr., II, 17-18 (Oct. 1916)([1]).

Described from the Khasi Hills, Pusa and Coimbatore, and doubtfully from Java. "Bred from larvæ feeding in flowers or pods of *Cajanus indicus* and *Phaseolus mungo* (Leguminosæ)"([1]). We have it from Pusa, Chapra and Coimbatore.

*Eucosma melanaula*, although only recently distinguished, is of common occurrence, probably throughout India, on various leguminous crop-plants. It has been found at Pusa on *arhar* (*Cajanus indicus*), *urid* (*Phaseolus radiatus*), *mung* (*P. mungo*), *moth* (*P. aconitifolius*) and Florida beggar-weed, the larva boring into flower-buds, flowers, top-shoots and seed-pods. In the case of pods, the seeds are eaten, and, when top-shoots are attacked, the larva tunnels to some distance even in the case of thick stems, the stem being killed back and the top leaves also being webbed over and eaten. In the case of flowers, they are spun together with silk and the larva lives concealed amongst the spun-up flowers. It is at times a decided pest and seems to occur at any suitable time of the year but in greatest numbers from August to October.

The full-grown larva is about 11 or 12 mm. long and 1·5 to 2 mm. broad, moderately stout, somewhat compressed dorso-ventrally, sides of body nearly parallel, uniformly yellow, occasionally greenish; head shiny yellow, yellow-brown or occasionally blackish; prothoracic shield unicolorous with head or paler; body segments distinct; tubercles show as somewhat shiny spots carrying thin hairs; legs and prolegs normal, unicolorous with body, hooklets on prolegs brown and arranged in a complete circle.

Pupation takes place within a white silken cocoon formed amongst spun-up top-leaves or between super-imposed blades of an older leaf, amongst spun-up flowers, or near the mouth of the tunnel in a bored pod. The pupal period is from five to eight days at the end of September. Before emergence, the pupa wriggles out through one end of the cocoon to some extent.

The pupa is about 6 to 7·5 mm. long and 1·5 to 2 mm. broad, cylindrical, brown, anal extremity rather obtuse ; abdominal segments with a transverse row of short black spines extending across dorsum from spiracle and another similar but faintly-developed row across posterior portion of segments ; anal segment dorsally armed with six upturned black spines. (Pusa Insectary Cage-slips 517, 611, 1644, 1689, and 1694.)

The coloration of the imago is very variable, some of the more common forms being shown in the figures.

### EUCOSMA BALANOPTYCHA, MEYR.

*Eucosma balanoptycha*, Meyr., Rec. Ind. Mus., V, 218(1), Exot. Micr., II, 18(2).

Originally described from Maskeliya, Puri and Konkan(1). Since reared at Coimbatore on leaves of *Pongamia glabra* (Leguminosæ)(2) in October 1914. We have it from Coimbatore (larva on *Pongamia* leaves) and from Ahmedabad (reared from larva eating galls on *Pongamia glabra* leaf).

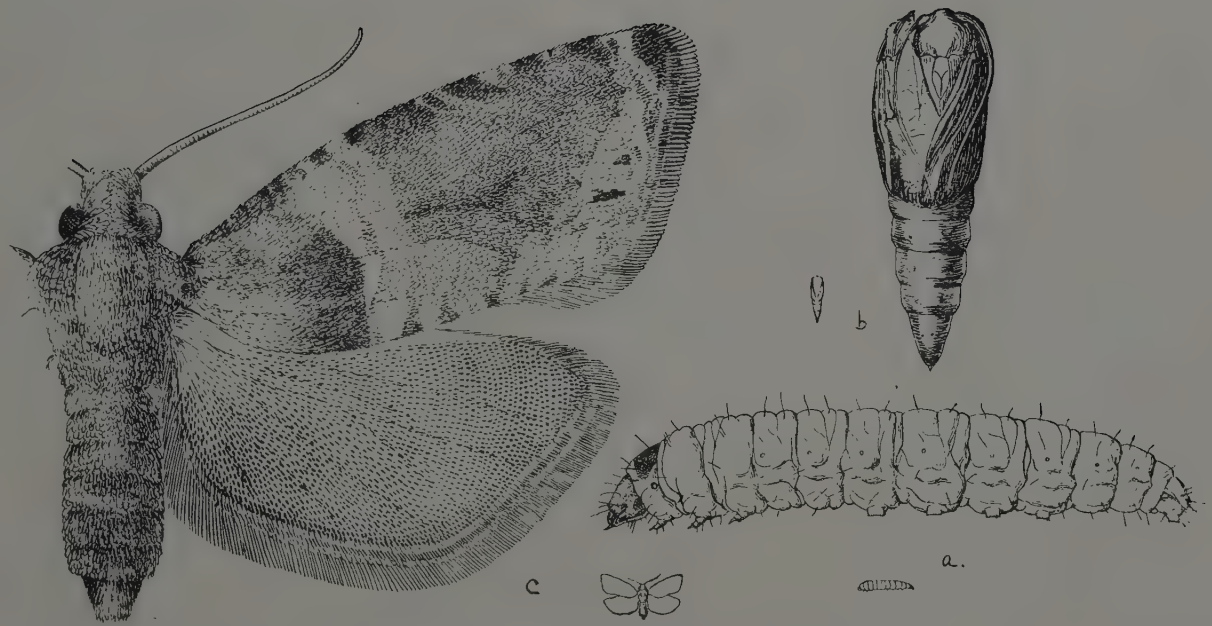
### EUCOSMA CLEPSIDOMA, MEYR.

*Eucosma clepsidoma*, Meyr., Exot. Micr., II, 18 (Oct. 1916)(1).

"Bred at Coimbatore in April from galls on an unidentified plant (*Fletcher*)"(1).

### EUCOSMA CONCILIATA, MEYR. MS. (PLATE X, FIG. 2.)

Larvæ were found at Pusa on 20th March and 20th April 1917, feeding on the flowers of *palas* (*Butea frondosa*). Some of the petals of the flowers, *viz.*, the wings and the keel, are joined towards their bases and the larvæ are usually found boring the thick conjoined parts, and they pupate in these parts in a sort of silken cocoon. The larva, when full-grown, is about 11 mm. long and 1·5 mm. broad across mid-body, slightly flattened, tapering towards either extremity, uniform pale yellow, the dorsal vessel showing through the skin and the primary tubercles looking like small brown points (under a lens) ; head smaller than prothorax, rather dark brown, shiny ; prothoracic shield medially divided, concolorous with head ; five pairs of equally developed prolegs. The pupal period in April is about six days. (Pusa Insectary Cage-slip 1536.)




*Eucosma zelota*:—*a*, Larva ( x 10) ; *b*, pupa (after emergence of moth) ( x 8) ; *c*, moth ( x 13).

PLATE XII.

EUCOSMA FŒNELLA, LINN.

*Tinea fœnella*, Linn., Syst. Nat. ed. X, p. 536 (1758)(1).

*Epiblema fœnella*, Meyr., Handbk., pp. 496-497 (1905)(2); Kennel, Spuler's Schmett. Eur., II, 283, t. 86 f. 26 (1910)(3).

*Eucosma fœnella*, Wlsm., A. M. N. H. (7), VI, 340 (1900)(4).

A palæarctic species, ranging from Europe to Armenia, China, Korea and Japan, and recorded from Dharmsala(4).

Larva yellow-whitish; head dark-brown; plate of 2 brownish ochreous; in stems and roots of *Artemisia vulgaris*. The larva is figured by Spuler(3) (Nachtr., Taf. X f. 29).

EUCOSMA ZELOTA, MEYR. (PLATE XII.)

*Eucosma zelota*, Meyr., Exot. Micr., II, 18 (Oct. 1916) (1); Proc. Second Entl. Meeting, p. 264 (1917)(2).

Described from Abbottabad, where the larvæ were found on 10th June 1916, spinning together three or four young rose leaves into a bunch. The leaves (or at least two of them) are folded longitudinally and the larva feeds inside the leaves, passing from one to another through communication-passages. The whole interior part of the folded leaves is thickly lined with white silk.

The full-grown larva is about 9 mm. long, moderately stout, cylindrical, rather flattened, pale brownish yellow or orange-yellow or dirty greenish-yellow, the contents of intestinal canal clearly visible through the skin; head shining black; prothoracic shield distinctly divided medially, shining black; legs black; prolegs yellowish; lateral flange well defined; body segments with scattered short whitish hairs arising from minute black warts.

Pupation takes place in a silken cocoon formed inside the bunch of spun leaves. Moths emerged between 16th and 25th June 1916.

EUCOSMA STEREOMA, MEYR.

*Eucosma stereoma*, Meyr., Exot. Micr., I, 33-34 (1912)(1).

Larva, described from Pusa records, is cylindrical, greyish-yellow; head flattened, yellow; plate of second segment large, yellow; spots with longish white hairs; in rolled terminal leaves of *Acacia* sp. (Leguminosæ); pupa in a white cocoon(1).

*Eucosma stereoma* was reared at Pusa in April 1911, from larvæ found in rolled-up flowers of *Pithecolobium dulce* or *Inga dulcis*, and again on 2nd and 4th August 1911, from larvæ found on 24th July rolling the top-leaves of a species of *Acacia*, living hidden and feeding on the leaves from within its tube. It pupates amongst the leaves in a white silken cocoon.

Larva about 8 mm. long, cylindrical, tapering very slightly posteriorly; head flattened, yellow; prothoracic shield large, yellow; body soft, uniformly greyish-yellow, segments moderately distinct, with longish white hairs arising from shiny chitinized plates concolorous with body; prolegs equally developed.

Pupa about 5 mm. long, cylindrical, tapering posteriorly, anal segment with yellowish cremastral hooks; abdominal segments anteriorly with a transverse row of small spinous processes across dorsal area. (Pusa Insectary Cage-slips 880, 910.)

EUCOSMA MELANONEURA, MEYR.

*Eucosma melanoneura*, Meyr., B. J., XXI, 866 (1912)(1).

Only known from the Khasi Hills(1).

The larvæ of this species are abundant at Shillong in September, spinning up the flowers of *Rhus semialata* into little knots and feeding on the flowers under cover of a silken tube covered with fragments of the flowers. The attacked flower-heads are quite conspicuous and in many cases practically every flower is destroyed. Pupation takes place within the larval galleries, the moths emerging towards the end of September and in October.

CROCIDOSEMA PLEBEIANA, Z.

*Crocidosema plebeiana*, Zeller, Isis, 1847, pp. 721-722(1).

*Crocidosema plebeiana*, Wlsm., P. Z. S., 1907, 1001-1002 [synonymy](2); Meyr., P. Z. S., 1908, 720(3); Willcocks, Ins. Pests Egypt, I, i., 320-321, t. vii ff. 5, 6 (1916)(4).

*Eucosma plebeiana*, Meyr., Tr. Linn. Soc. (2) XIV, 268 (1911)(5), Entom. Mitteil., Suppl. III, p. 48 (1914)(6).

This species is widely distributed around the Mediterranean Region(1, 2, 4), St. Helena(2), West Indies(2), Central and South America(2), Australia(2) and Hawaii(2), and has also been recorded from Pundaluoya in Ceylon(2) and is doubtless of common occurrence throughout India.

Larva on *Althæa*, *Lavatera*, *Malva* and allies(4).

Willcocks(4) gives the following description of the early stages :—

"*Egg.* The eggs are laid singly on the seed capsules or fruits and flower-buds of the ornamental hollyhock (*Althæa* sp.) ..... The egg ..... is ..... 0·6 mm. long by 0·36 mm. wide; it is oval in form, convex, and the shell is very rugose in appearance. The colour is pale at first and then a horse-shoe-shaped irregular line of scarlet becomes visible and this may gradually spread until the whole egg becomes red or orange-red in colour. Before hatching the egg again becomes pale with dark spot at one end formed by the head of the young larva and a pinkish or reddish line along one side.

"*Larva.* The larvæ feed on the green unripe seeds or in the undeveloped flower-buds. When full-grown the larva measures about 12 mm. in length and is green in colour with a brownish head.

"*Pupa.* The pupa (Plate VII, fig. 6) is found in the damaged seed capsules. In general appearance it is not unlike the pupa of the pink bollworm [*Platyedra gossypiella*], but with the aid of a magnifying glass it can be readily distinguished from the latter by the dorsal row of thorn-like projections on the basal margin of the abdominal segments and there is also a median row of these spines, but the latter are much smaller and less conspicuous than the others."

Mr. Willcocks also states that he found on a green cottonboll an egg which he believed to belong to *C. plebeiana*, but he failed to rear the larva.

### [BACTRA LANCEOLANA, HB.

*Tortrix lanceolana*, Hubner, Samml. Eur. Schm., VII, t. 13 f. 80 (1797)(1).
*Bactra lanceolana*, Wlsm., A. M. N. H. (7), VI, 333-334 (1900)(2); Meyr., Pr. Linn. Soc. N. S. W., XXXVI, 253 (1911)(3).

This species, whose larva feeds on rushes (as probably do most of those of the described Indian species), has been recorded from India(2) but doubtless in error(3), and should be removed from the Indian list.]

### BACTRA TRUCULENTA, MEYR.

*Bactra truculenta*, Meyr., B. J., XIX, 586 (1909)(1).

Originally described from North Coorg(1), we have this from the Palni Hills, Coimbatore, Pusa and Peshawar. At Pusa and Coimbatore it has been reared from larvæ feeding in stems of *Cyperus rotundus*.

### POLYCHROSIS FETIALIS, MEYR.

This species has been reared at Pusa from a larva found feeding in a flower-head of *Leucas* sp.

### POLYCHROSIS CELLIFERA, MEYR.

*Polychrosis cellifera*, Meyr., B. J., XXI, 869-870 (1912)(1).

Originally recorded from Colombo(1) and Pusa(1), this species has been reared at Pusa at the end of March 1916, from larvæ found on tender leaves of *Eugenia jambolana* on 10th March. Only one specimen was reared, together with three of *Spilonota rhothia*, and the larvæ were not distinguished. (Dwarka Prasad Singh's Cage-slip dated 10th March 1916.)

### LOBESIA ÆOLOPA, MEYR.

*Lobesia æolopa*, Meyr., B. J., XVII, 976 (1907)(1), P. Z. S., 1908, 716(2), Exot. Micr., I, 565 (1916)(3).

Originally described from Maskeliya and Peradeniya, in Ceylon, and from Bombay(1), this species has also been recorded from Cape Colony(2) and Reunion(3). It seems to be widely distributed in India and Burma, the Pusa collection containing examples from Pusa, Coimbatore, Pollibetta, Mercara, Bangalore, Shillong and Moulmein.

In Ceylon it was bred by Rutherford from *Cajanus indicus*(3).

*Lobesia æolopa* has been bred at Coimbatore and Mettupalayam by Y. Ramachandra Rao from larvæ webbing flowers and leaves and feeding on fruits of *Lantana camara*. The pupal period in December and January is from seven to ten days.

The full-grown larva is described by Ramachandra Rao as about 8 mm. long, dark brown or clay brown with a tinge of green in some segments; head shiny dark brown tinged with yellow; prothoracic shield less shiny than head over whose posterior part it fits like a hood, semi-circular, broader than head, somewhat roughened; body segments twice breadth of head, each segment with several (usually about three pairs dorsally, four pairs laterally and a few ventrally) prominent yellowish-white shields which carry short setæ; legs normal, blackish brown; prolegs normal.

It has also been reared at Pusa from larvæ found in the flowers of *Leucas cephalotes* on 14th December 1915, the moths emerging between 8th January and 24th February 1916.

### LOBESIA GENIALIS, MEYR.

*Lobesia genialis*, Meyr., B. J., XXI, 869 (1912)(1).

This species was originally described from Peradeniya(1) but seems to be widely distributed in Southern India, and we have it from Coimbatore, the Anamalai Hills, Bangalore and Sidapur (Coorg).

This species has also been bred at Coimbatore by Y. Ramachandra Rao from larvæ webbing flowers of *Lantana camara*. The larva is distinguishable from that of *L. æolopa* by its greenish colour. The eggs, laid on 23rd-24th December 1916, hatched on 27th December, a larva pupated on 10th January, and a moth emerged on 19th January 1917, so that the whole life-cycle occupies about four weeks. The stages are described by Ramachandra Rao as follows:—

The egg is about 0·5 mm. in diameter, opalescent yellowish, very much flattened and very irregular in outline; when laid it is probably semi-fluid and adapts itself to the surface on which it is laid. Under a low magnification

Fig. 1. *Argyroploce illepida.*

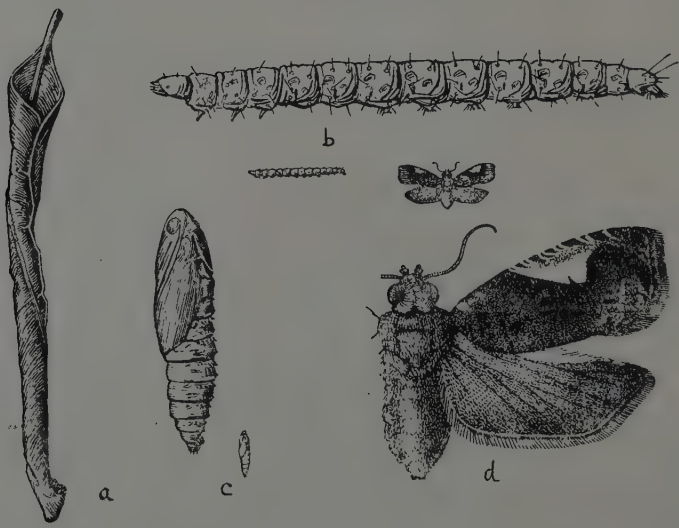



Fig. 2. *Argyroploce leucaspis*:—*a*, Litchi leaf rolled by larvæ ; *b*, larva ; *c*, pupa ; *d*, moth ( x 5).

the surface of the eggshell appears to be reticulated, but under a higher power this reticulation is resolved into an exquisitely beautiful combination of many-rayed stellar ridges. In nature the egg is laid on leaves, leaf-buds, tops of flower-buds, or on fruits.

The newly-hatched larva is about 1 mm. long, cylindrical, creamy yellow, covered with short hairs; head large, flattened, shiny black; prothoracic shield flattened, light brown. A week after hatching it is 6·5 mm. long, head with a lateral brown streak, prothoracic shield margined with black, brown posteriorly.

The full-grown larva is about 9 mm. long, green, or yellowish-green, with prominent stiff setæ; head yellowish with a black lateral streak; prothoracic shield yellowish bordered with black except anteriorly.

Pupation takes place within a silken cocoon formed within a folded edge of a leaf. Pupal period about eight days.

Pupa 6 mm. long and 1·5 mm. broad across metathorax, rather slender, gradually tapering posteriorly, greenish brown, anal segment with five or six hairs with recurved tips. Posterior margin of each abdominal segment distinctly raised above anterior edge of its successor, each segment armed anteriorly and posteriorly with a submarginal transverse row of spines, composed anteriorly of rather large stout spines directed posteriorly, posterior row of much smaller, but far more numerous and more closely-set, denticles.

### ARGYROPLOCE CITHARISTIS, MEYR.

*Argyroploce citharistis*, Meyr., B. J., XIX, 595 (1909)([1]), Rec. Ind. Mus., V, 219([2]).

This species is known from Moulmein([1]), the Khasi Hills([1]), North Coorg([1]) and Quilon (Travancore)([2]). It is now recorded from Pusa where it was reared from a larva feeding in flower-heads of *Leucas* sp.

### ARGYROPLOCE ILLEPIDA, BUTL. (PLATE XIII, FIG. 1.)

*Teras illepida*, Butl., T.E.S., 1882, 42([1]).

*Cryptophlebia carpophaga*, Wlsm., I.M.N., IV, 106, t. 7 f. 1 (1899)([2]); Lefroy, Ind. Ins. Life, p. 531, t.28 ff. 11, 12 (1909)([3]).

*Cryptophlebia illepida*, Wlsm., Fauna Hawaii, I. 681, t. 10 ff. 23-25([4]).

*Argyroploce illepida*, Meyr., Rec. Ind. Mus., V, 218([5]), Pr. Linn. Soc. N.S.W., XXXVI, 265 (1911)([6]), Tr. Linn. Soc.(2) XIV, 269 (1911)([7]); Fletcher, South Ind. Ins., pp. 449-450, f. 327 (1914)([8]), Proc. Second Entl. Meeting, pp. 230, 234, 257 (1917)([9]).

Widely distributed throughout India and Ceylon, having been recorded from Calcutta([2, 5]), Pusa([6]), Gujarat([3]) and Southern India([8]). Also found

in South Africa(5), the Seychelles(7), Australia(5, 6), and Hawaii (1, 4, 5). We have it from Undugoda, Coimbatore, Surat, Pusa and Chapra.

Larva recorded in fruits of *Cassia*, *Feronia*, and *Nephelium*(7).

Lefroy(3) has given good figures of the larva and notes that it is found commonly in Gujarat, boring in the pulp of fruits of wood-apple (*Feronia elephantum*) and when full-fed preparing in the fruit a silken excrement-covered cocoon, from which the moth emerges after a week.

*A. illepida* was originally described from India by Lord Walsingham(2) under the name of *Cryptophlebia carpophaga*, from examples reared in Calcutta from pods of *Cassia fistula* and *C. occidentalis*, the male and female moths, larva and pupa-case being figured.

These figures of the larva and pupa-case were reproduced in *South Indian Insects*(8), where a new figure of the moth was also given and tamarind (*Tamarindus indica*) added to the list of foodplants.

Litchi fruits, when available, seem to be a very favourite food of the larva and it has been found in these fruits at Pusa in 1907, 1911, and 1914 and probably occurs every year, although in some years it is far more abundant than in others. Thus, I. H. Burkill notes that in May 1901, ninety-nine per cent. of the litchi fruits in the Calcutta market were tenanted by these larvæ which eat the funicle or stalk of the seed and bore into the seed itself; the funicle, being the way by which food passes to the seed, is probably highly nutritious as long as growth is actively going on and in it the larva tunnels until the fruit is perfectly ripe when the larva leaves it and emerges by biting through the wall at the base close to the stalk, and then spins its cocoon in some convenient crevice.

Besides the foregoing foodplants, *A. illepida* has also been reared at Pusa from *dhaincha* (*Sesbania aculeata*) pods and from *bael* (*Ægle marmelos*) fruits; at Coimbatore from pods of *babul* (*Acacia arabica*) and *agathi* (*Sesbania grandiflora*); and at Sabour in April 1917, from pulp of a purchased orange fruit. In the case of *dhaincha* a few pods were found bored in November 1917, the larvæ being found wholly within the pod, feeding on the green seeds, the frass being extruded through a hole in the side of the pod; only a few larvæ were found and the damage done was negligible. In the case of *bael* several larvæ were found on 29th November 1913, eating the pulp of a fruit which showed little sign of attack from the outside except for a few small holes and a small crack in the hard shell of the fruit. In the case of tamarind the larvæ bore into the seeds.

It cannot be said, however, that *A. illepida* is much of a pest as a rule. Even in the case of a high infestation of litchi fruits, comparatively little damage is done to the fleshy edible portion of the fruit.

The full-grown larva is about 15 to 19 mm. long and 2 to 3 mm. broad across the thorax, cylindrical, tapering slightly posteriorly, segments distinct, skin soft and smooth, colour rather variable, usually light yellow, darker dorsally, sometimes greyish with a yellow tinge, pinkish brown, reddish, or pale yellow with a greenish tinge; head broad, shiny reddish-brown; prothoracic shield large, shiny dark-brown, divided medially; tubercles rather large, rounded, brownish or yellowish, each bearing a single thin brown hair; anal plate large, dark brown, rather glossy; spiracles oval with a black rim enclosing a clear space; a whitish tube connecting spiracles visible beneath the skin; legs and prolegs normal; prolegs pale yellow, hooklets brown, disposed in a circle.

Pupation takes place either within the attacked fruit (*dhaincha*, *bael*) or outside of it (*litchi*) in a thin white silken cocoon which either lines the interior of the larval gallery, one end of the cocoon being near an exit hole which is covered with frass, or which is spun up in any convenient crevice. At emergence of the moth, which takes place seven to fourteen days after spinning up, the pupa is almost wholly protruded from the cocoon.

The pupa is about 8 mm. long and 2 mm. broad, cylindrical, tapering posteriorly, both extremities rounded, yellow-brown; second to seventh abdominal segments dorsally with two transverse rows of spines, one on anterior, the other on posterior, portions of segments; eighth and ninth abdominal segments with only one transverse row of spines dorsally; anal segment with about eight cremastral hooks. (Pusa Insectary Cage-slips 537, 898, 1019, 1064 and 1738.)

ARGYROPLOCE APROBOLA, MEYR.

*Eccopsis aprobola*, Meyr., T.E.S., 1886, 275(1).
*Platypeplus aprobola*, Wlsm. in Moore, Lep. Ceylon, III, 495, t.208 f.z (1887)(2).
*Argyroploce aprobola*, Meyr, Rec. Ind. Mus., V, 218 (3), Pr. Linn. Soc. N.S.W., XXXVI, 275 (1911)(4), Tr. Linn. Soc. (2) XIV, 269 (1911)(5), Entom. Mitteil. Suppl. III, p. 49 (1914)(6); Proc. Second Entl. Meeting, pp. 219, 230, 267 (1917)(7).

Occurs commonly throughout India and Ceylon, ranging to the Seychelles(3, 5) and Amirante Islands(5), Chagos Islands(5), Formosa(6), New Guinea(4), Queensland(4) to Tonga(1, 5) and Tahiti(2).

We have it from Pusa, Chapra, Palamau, Bassein Fort (Bombay), Surat, Kallar, Coimbatore and Pollibetta (South Coorg).

At Coimbatore the larva has been found boring into rose buds and rolling mango leaves, at Kallar (Nilgiris) on *Lantana camara*, at Bassein Fort on mango and is said to have been reared at Nagpur on Dahlia flowers(7), whilst at Pusa it has been reared from larvæ found rolling young leaves of mango (*Mangifera indica*), litchi (*Nephelium litchi*), rose, *Cassia tora*, and *asokh* (*Polyalthia longifolia*). Sometimes the larvæ occur in considerable numbers and may do a little damage to the young leaves.

The full-grown larva is about 16 to 20 mm. long and 2 mm. broad, cylindrical, rather flattened, tapering slightly towards extremities, rather transparent uniform green or pale yellow; head flattened, red-brown, brownish or yellowish; prothoracic shield large, darker than head; spiracles small, rounded, rimmed with brown; body segments with small dull white hairs; first two pairs of legs black, third pair green or yellow; prolegs with very minute hooklets.

The larva rolls up tender leaves, feeding on them from under shelter. Pupation takes place inside a rolled leaf which is lined by a thin layer of white silk. Nearly the whole of the pupa is protruded from the cocoon on emergence of the moth, which occurs after a pupal period of about ten days.

Pupa about 10 mm. long, cylindrical, tapering posteriorly, brown; dorsal portion of abdominal segments with two transverse rows of posteriorly-directed short spines; anal segment with four cremastral hooks which are entangled in the silken lining of the cocoon. (Pusa Insectary Cage-slips 600, 809, 932, 1302, 1448, 1691 and 1750.)

### ARGYROPLOCE CENCHROPIS, MEYR. MS.

Larvæ were found at Pusa on 11th June 1917, in fruits of *lashora* (*Cordia myxa*), the attacked fruits showing no external symptom of attack. The larvæ seem to feed upon the kernel, gnawing a hole through the wall of the stone. Four larvæ were found in about one hundred fruits examined. The larva is about 10 mm. long, white; head yellow or brownish yellow; prothoracic shield brownish; five pairs of short, equally developed prolegs. Pupation occurred in a silken cocoon spun on the bottom of the cage under a dry fruit. One moth emerged on 28th June. (Pusa Insectary Cage-slip 1595.)

### ARGYROPLOCE EBENINA, MEYR.

*Argyroploce ebenina*, Meyr., Exot. Micr., II, 20 (October 1916)(1).

Bred at Karwar, N. Kanara, "in July from larvæ feeding gregariously between spun leaves of *Diospyros* (Ebenaceæ); larva dark greenish-fuscous, with whitish hairs, head brown, plate of 2 black; pupa beneath folded edge of leaf (*Maxwell*)(1)."

## ARGYROPLOCE EROTIAS, MEYR.

*Platypeplus erotias*, Meyr., B.J., XVI, 584-585 (1905)(1).

*Argyroploce erotias*, Meyr., Proc. Linn. Soc. N.S.W., XXXVI, 269 (1911)(2); Fletcher, Entl. Note 75 (1916) (3), Proc. Second Entl. Meeting, p. 219(4).

This species was originally described from Ceylon(1) and has since been recorded from New Guinea(2), Timor(2) and India(3, 4). We have it from Pusa, Bombay, Kallar, and Kandy. At Bombay the larva was found boring into mango shoots.

*Argyroploce erotias* "has been reared at Pusa from larvæ found feeding on tender mango leaves in March 1912. The larva is about 16 mm. long by 2 mm. broad, slightly flattened, tapering towards the extremities, in colour uniform green, the skin soft and segments distinct; head flattened, greyish yellow, smaller than prothorax which is entirely covered by a shield darker than the head; all legs present and equally developed. The larva rolls up the tender leaves of young mango shoots by means of white silk threads, living in hiding and biting holes in the rolled leaves. When full-fed, it pupates in a cocoon formed of rolled leaf lined with white silk; the pupa is protruded to some extent before emergence of the moth. We also have specimens reared in October 1905, from larvæ boring mango shoots in Bombay(3)."

This species has also been reared at Pusa in February 1915, from larvæ webbing tender leaves of *Loranthus* sp. and in December 1915, from leaves of *Cynoglossum* sp.

*Argyroploce erotias* has also been reared by Y. Ramachandra Rao at Kallar from a pupa found in a folded leaf of *Lantana camara*.

This pupa was described as follows:—8·5 mm. long and 2·5 mm. broad, yellowish or reddish brown, rather shiny, rather slender, cylindrical, anteriorly blunted; frontal part of head with a prominent raised flat ridge bounded on each side by depressions from which the antennæ arise; anal segment conical terminating in a slightly flattened heavily chitinized red-brown apex bearing six or eight strong recurved hooks; abdominal segments anteriorly with a submarginal sharply excised ridge, following close upon which is a row of strongly developed posteriorly-directed spines (with a few smaller spines interspersed in some cases), and posteriorly with an ante-marginal transverse row of smaller but well-developed and more numerous spines; second segment of abdomen on each side with a subdorsal prominently-marked shallow pit guarded by strongly-developed chitinous red-brown lips; wing-sheaths extending to middle of fourth abdominal segment.

### ARGYROPLOCE LEUCASPIS, MEYR. (PLATE XIII, FIG. 2.)

*Eucosma leucaspis*, Meyr., Gardiner's Fauna Geogr. Maldives, I, 126 (1902)([1]), B. J., XVII, 136 (1906)([2]).

*Argyroploce leucaspis*, Meyr., B. J., XIX, 592([3]), Tr. Linn. Soc. (2) XIV, 270 (1911) ([4]); Proc. Second Entl. Meeting, p. 229 (1917)([5]).

Recorded from Ceylon([2]), the Maldive Islands([1]), and the Seychelles([4]). In India it is widely distributed and we have it from Pusa, Nagpur, the Khasi Hills and Kandy.

*A. leucaspis* has been reared at Pusa in August 1917, from larvæ found rolling tender *litchi* (*Nephelium litchi*) leaves. A single leaf may be rolled longitudinally or two or three leaves may be rolled up together. From larvæ collected on 14th August 1917, moths emerged from 23rd August to 8th September 1917.

The full-grown larva is about 14 mm. long and 1·5 mm. broad, elongated, tapering slightly towards either extremity, skin soft, uniform green with a yellowish tinge, the colour changing to coppery grey prior to pupation; head yellow; primary hairs thin and short; prolegs equally developed, short. The larvæ are very sensitive and jump vigorously when disturbed, usually taking several springs before coming to rest. (Pusa Insectary Cage-slip 1652.)

### ARGYROPLOCE PARAGRAMMA, MEYR. (PLATE XIV, FIG. 1.)

*Argyroploce paragramma*, Meyr., B. J., XIX, 598 (1909)([1]); Fletcher, Pusa Ann. Rept. 1917-18, p. 102, t.17 f.1. (1918)([2]).

Bred at Pusa in September, from stem of bamboo([1]).

This species was bred in September 1905, at Pusa from larvæ found boring into young bamboos. On 28th July 1917, larvæ were again found at Pusa boring into bamboos, the younger larvæ being usually found under and at the base of the loose leaf-like top portions of the sheaths, and larger larvæ boring the tender stem under cover of the sheaths. In August 1917, the larvæ were noted as being very common at Pusa; not only were they found in young shoots but also in older shoots ten to twelve feet high, boring in at the eyes under the sheaths, their presence being indicated by the frass. On 1st September 1917, the larvæ were again noted as being quite common. In cases where several larvæ bore into a young shoot, this is killed off; but in older shoots the larvæ do comparatively little damage. This species, however, must be considered as a distinct pest of bamboo.

The full-grown larva is about 15 to 17 mm. long, cylindrical, tapering slightly towards either extremity, brown; head flattened, red-brown; prothoracic

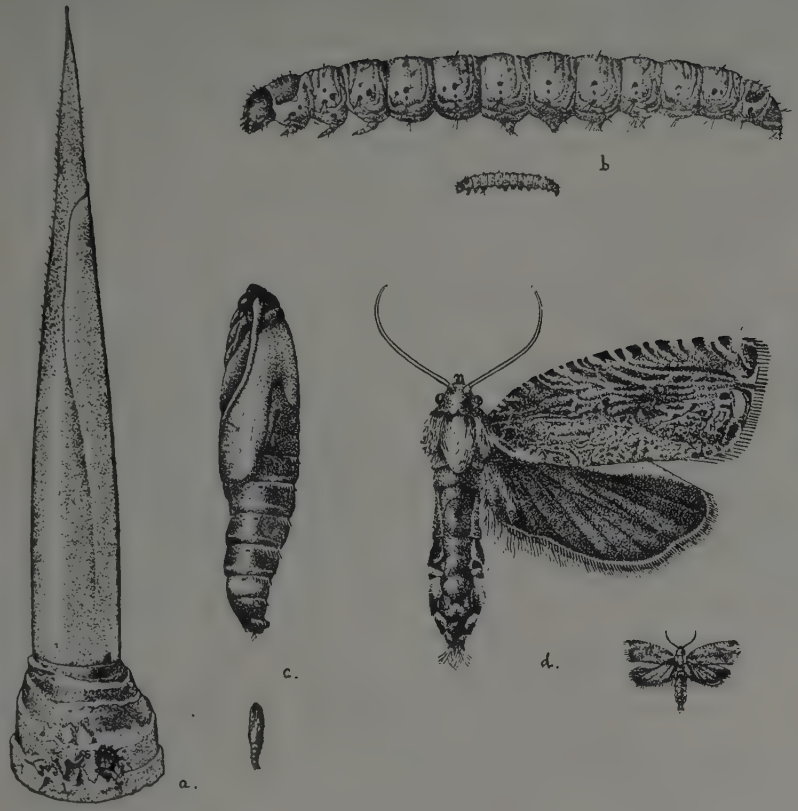



Fig. 1. *Argyroploce paragramma*:—*a*, Bamboo shoot with outer sheathing leaves removed, showing bore-hole of larva; *b*, larva; *c*, pupa; *d*, imago; natural sizes and magnified (x 5).

Fig. 2. *Laspeyresia leucostoma*:—*a*, Tea-leaf rolled by larva; *b*, larva; *c*, pupa; *d*, moth; natural sizes and magnified.

PLATE XIV.

shield large, dark-brown, almost black; prolegs equally developed; the tubercles on body segments forming distinct rounded warts.

In confinement pupation took place in a thin silken cocoon lining folds of paper or cloth or between fragments of bamboo-sheaths; under natural conditions the cocoon is probably placed beneath the leaf-sheaths. The brown pupa protrudes to some extent through one end of the cocoon on emergence of the moth. (Pusa Insectary Cage-slips 132, 1631.)

We have this from Pusa, Chapra and Gauhati. It is probably widely distributed in the Plains.

### ARGYROPLOCE POETICA, MEYR.

*Eucosma mosaica* (*nec* Low.), Meyr., B. J., XVIII, 138-139 (1907)(1).
*Argyroploce poetica*, Meyr., B. J., XIX, 437 (1909)(2), Proc. Linn. Soc. N.S.W., XXXVI, 282-283 (1911) [Redescr.] (3).

This species was originally described from Maskeliya (Ceylon)(1) and the Palni Hills, and has since been recorded from North Australia(3). It has been reared at Pusa in October 1917, from larvæ found rolling leaves of *Polyalthia longifolia*.

### ARGYROPLOCE RHYNCHIAS, MEYR.

*Platypeplus rhynchias*, Meyr., B. J., XVI, 586 (1905)(1).
*Argyroploce rhynchias*, Mevr., Exot. Micr., I, 275 (1914)(2).

Originally described(1) from Ceylon, this species has been bred from pods of *Canavalia* in Mauritius(2).

### ARGYROPLOCE SEMICULTA, MEYR.

*Argyroploce semiculta*, Meyr., B. J., XIX, 604 (1909)(1).
*Argyroploce semiculta*, Meyr., Exot. Micr., II, 20 (October 1916)(2).

"Larva feeding among very tightly-spun terminal leaves of *Alseodaphne semecarpifolia* (Lauraceæ); pupa beneath folded edge of same leaf (*Maxwell*)(2)."

Originally described from Hakgala, in Ceylon, and the Khasi Hills(1). Maxwell's record of the larva was presumably made in N. Kanara.

### ARGYROPLOCE TONSORIA, MEYR.

*Argyroploce tonsoria*, Meyr., B. J., XIX, 592-593 (1909)(1).

Bred from larva in fruit of *Barringtonia racemosa* from Bentota, in Ceylon(1).

### LASPEYRESIA KŒNIGANA, FB.

*Pyralis kœnigana*, Fabr., Ent. Syst. III, ii, 279 (1794)(1).
*Hemerosia aurantiana*, Pryer, Cist. Ent. II, 235, t.4 f.12 (2).
*Laspeyresia aurantiana*, Meyr., Pr. Linn. Soc. N.S.W., XXXVI, 292-293, (1911)(3).
*Laspeyresia kœnigana*, Fletcher, S. Ind. Ins., pp. 450-451, f. 328 (1914)(4).

A very widely-distributed species in the Plains of India and Burma. The Pusa collection contains specimens from Coimbatore, Siruguppa (Bellary), Surat, Purulia, Chapra, Pusa, Minbu and Tatkon (Burma).

At Surat it is said to have bred from larvæ on *mogra* (*Jasminum sambac*) and at Coimbatore it has been reared from larvæ feeding on leaves of *nim* (*Melia azadirachta*). The larvæ have also been found on *nim* at Serampur by Mrs. Drake.

### LASPEYRESIA HEMIDOXA, MEYR.

*Laspeyresia hemidoxa*, Meyr., B. J., XVIII, 145 (1907)(1).

This lovely little moth was described from the Khasi Hills(1).

We have it from the Khasi Hills (about 1,500 feet) and Taliparamba (Malabar). At Taliparamba a single specimen was reared on 2nd August 1909, from a larva boring in shoots of pepper vine.

### LASPEYRESIA LEUCOSTOMA, MEYR. (PLATE XIV, FIG. 2.)

*Laspeyresia leucostoma*, Meyr., B. J., XXI, 876 (1912)(1), Exot. Micr., II, 23 (1916) (2); Proc. Second Entl. Meeting, p. 20 (1917)(3).

Described originally from Ceylon (Maskeliya), the Palni and Khasi Hills(1).

"Larva feeding in rolled leaves of *Thea sinensis* (Fletcher)"(2).

This species occurs also in the Nilgiris, having been reared at Coimbatore from larvæ found rolling tea-leaves on Waterfall Estate in May 1915, and in the Kanan Devan Hills (Travancore) whence we received in April 1917, by kind courtesy of Mr. A. G. Murray, of Munaar Estate, specimens of larvæ from which a moth was reared at Pusa on 14th May 1917. I have also seen a specimen from Assam.

This caterpillar is commonly called "Tea Flush Worm" in Southern India and its habits are apparently much the same as those of *Homona coffearia*. No detailed description was made but the accompanying figures show an attacked tea-shoot, larva, pupa and moth of this species. (Pusa Insectary Cage-slip 1556.)

### LASPEYRESIA CAPPARIDANA, Z.

*Grapholitha capparidana*, Zeller, Isis, 1847, 734-735(1); Rag., Ann. S.E. Fr. 1894, 218(2).

Originally described from Sicily(1), this species has been found in India at Pusa and is doubtless widely distributed. Its specific name records the fact that it was originally found associated with a species of *Capparis*.

The larva has been found at Pusa boring stems of *bagnahi* (*Capparis horrida*), tunnelling right through the stem and filling the tunnels with pellets of frass. Small holes are found here and there on the exterior of the affected stem, their openings being covered with frass bound together with silk.

The larva is about 8 mm. long, cylindrical, yellow, with equally developed prolegs; head, prothoracic and anal shields yellow-brown.

The larva pupates inside the stem in a thin white silken cocoon formed near a hole and with the head of the pupa turned towards the hole. At emergence of the moth, the pupa protrudes from the cocoon to some extent and the empty pupa-cases may be seen protruding from the attacked stems.

The pupa is about 5 mm. long, brown; abdominal segments with minute hooks arranged across dorsum; anal segment rather truncate with two small upturned hooks dorsally and eight slender cremastral hooks arranged circularly.

From stems collected on 10th February 1910, moths emerged between 14th February and 20th March 1910. (Pusa Insectary Cage-slip 819.)

### LASPEYRESIA MAMERTINA, MEYR. MS.

This species has been reared at Pusa from larvæ found on 21st January 1917, fastening together superimposed leaves of *Loranthus* and eating the tissues of the leaves whilst remaining hidden. The moths emerged between 1st and 7th March. (Pusa Insectary Cage-slip 1519.)

### LASPEYRESIA PTYCHORA, MEYR.

*Laspeyresia ptychora*, Meyrick, B. J., XVIII, 147 (1907)(1), Proc. Linn. Soc. N.S.W., XXXVI, 288 (1911) [Redescr.](2), Exot. Micr., I, 565 (1916)(3).

Bred from larvæ feeding in pods of *Vigna sinensis*, "cowpea," at Salisbury, Rhodesia; also from Barberton, Transvaal. Doubtless spread artificially with its foodplant(3).

Originally described from Madulsima and North Coorg(1), this species is also known from Queensland(2) and we have it from Coimbatore, where it was bred on 21st February 1915, from a larva on pods of *Cajanus indicus*, and from Cherrapunji.

### LASPEYRESIA PYCNOCHRA, MEYR. MS.

Bred at Coimbatore on 20th March 1916, from a larva found in pods of *agathi* (*Sesbania grandiflora*).

### LASPEYRESIA MALESANA, MEYR. MS.

Bred at Coimbatore on 20th March 1916, from a larva in *Parkinsonia* pods. Also reared at Coimbatore from *Cassia corymbosa* pods.

### LASPEYRESIA DÆDALOTA, MEYR.

*Laspeyresia dædalota*, Meyr., Exot. Micr., II, 23 (October 1916)(1).

Bred at Pusa "in July from flowers of *Cassia fistula* (Leguminosæ)(1)." Larvæ were found on 27th June 1915, damaging unopened flowers of *Cassia fistula* and moths emerged between 8th and 15th July. No description of the early stages was made. (Tahl Ram's Cage-slip 22.)

### LASPEYRESIA JACULATRIX, MEYR.

*Laspeyresia jaculatrix*, Meyr., Rec. Ind. Mus. V, 219(1); Lefroy, Ind. Ins. Life, pp. 530-531 (1909)(2).

Described from Calcutta and Pusa, where the larvæ were found beneath bark of *Dalbergia sissu*(1). The Pusa collection contains specimens from Pusa, Palamau and the Shevaroys.

"The larvæ are found in the bark of the sissu tree (*Dalbergia sissu*) and occur there abundantly. Pupation takes place in a fine silken cocoon. Apparently these larvæ are the hosts of a small Bombylid fly, which has been reared from a batch of larvæ in sissu bark; the food of the larva is not known but it probably is the bark of the tree.

"The caterpillars spend the winter in the bark of the tree and have a curious habit of coming out at night during a few days in March, crawling about on the bark and, soon after daylight, retreating into the bark again; immense numbers of them can be seen in the early morning on these days and the phenomenon is apparently so regular that the crows know it, and we have in four successive years (1906-1909) seen crows collected round trees on which these caterpillars were walking and feeding on them. Apparently this proceeding is preliminary to pupating and is probably the search for a good sheltered nook in which pupation can be accomplished in such a way as to enable the moth to emerge. The moths emerge at various dates during May and June and there are probably two broods, before the hibernation brood referred to above. The moths are found flying about gregariously and this species is quite commonly captured where the sissu grows abundantly(2)."

The above statement that the larval food is probably the bark of the tree is not correct; the larva feeds on the leaves and apparently only hides under the bark in the intervals of feeding. Pupation may take place under the bark or between two rolled or superimposed leaves, the cocoon lining the leaves being much larger than seems requisite to contain the enclosed pupa. One individual which pupated amongst leaves on 23rd February 1914, emerged as a moth on 7th March 1914; but the period of emergence is a prolonged one and specimens have been bred out between 30th April and 2nd July from larvæ collected at the end of March and between 29th May and 20th July from larvæ collected in the latter half of May, so that it appears that the broods are irregular and overlap one another.

As noted above the larvæ are attacked by a Bombylid fly whose maggots consume the entire contents of their host after the latter has pupated and pupate inside its empty pupa-case. These Bombylid flies have been bred out between 15th and 24th April 1916.

The larvæ are also attacked by a Hymenopterous parasite which was reared between 24th March and 2nd April 1914. The parasitic grubs emerged from the body of their larval host and formed cocoons within rolled leaves but apart from the dead body of the host.

The full-grown larva is about 10 mm. long, subcylindrical, pale yellow; head brown, flattened, small; legs and prolegs normal, uniolorous with body.

The pupa is about 5 mm. long, cylindrical, slightly tapering towards either extremity, anal extremity blunted, reddish brown; abdominal segments dorsally with transverse rows of minute spines; anal segment with four cremastral hooks. (Pusa Insectary Cage-slips 336, 1030, 1056, 1391; C.S. Misra's Cage-slip 32; A. Mujtaba's Cage-slip 1.)

### LASPEYRESIA TRICENTRA, MEYR.

*Laspeyresia tricentra*, Meyr., B. J., XVII, 734 (1907)(1), P. Z. S., 1908, 721-722(2); Lefroy, I.I.L., p. 531, t.54 (1909)(3); Fletcher, S. Ind. Ins., p.451, t.40 (1914)(4); Proc. Second Entl. Meeting, p. 70 (1917)(5).

*Dicrocrampha subsequana*, Swinh., Cat. Moths India, p. 699 (1889), [*nec* Haw.](6).

Larva in stems of *Crotalaria*(1). Widely distributed throughout India and Ceylon. Also recorded from Transvaal(2).

"*L. tricentra*, Meyr., is described from the Deccan, the larva tunnelling in the shoots of Sann-hemp (*Crotalaria juncea*)(3)."

The Pusa collection contains specimens from Surat, Bassein Fort (Bombay) and Yercaud, and from Coimbatore (reared from cowpea pods).

This species has been confused with *L. pseudonectis* and it is doubtful whether the earlier Pusa records, ascribed to *L. tricentra*, are really referable to this species.

LASPEYRESIA PSEUDONECTIS, MEYR. (PLATE XV.)

*Laspeyresia pseudonectis*, Meyr., B. J., XVIII, 146-147 (1907)(1); Lefroy, Ind. Ins. Life, p. 531, t.54 [?] (1909)(2); Proc. Second Entl. Meeting, pp. 69-70 (1917)(3).

Larva tunnels stems of *Crotalaria juncea* at Surat in October(1).

"*L. pseudonectis*, Meyr., has the same habit [as *L. tricentra*, Meyr.] and was reared from Sann-hemp at Surat, and in Bihar. It is a common pest to this crop, and with the proceeding [preceding] is probably widespread in India. [Plate LIV](2)." It may be added that the Plate LIV here referred to is a very poor one and it is doubtful whether it really refers to *L. pseudonectis* or *L. tricentra*.

"*Laspeyresia pseudonectis* attacks Sann-hemp whilst the crop is still young, about five or six inches high. At that stage of growth the caterpillar attacks the top-shoot which is formed into a characteristic gall. The attack does not stop altogether the growth of the plant, which grows in length. In later stages of growth of the plant, the attack takes place at the axils of leaves, where also a swelling is formed. In this latter case, the fibre is affected. There may be more than one gall in the same plant. The caterpillar feeds inside the gall and pupates there; whilst young it is green but becomes a bright red before pupation. The caterpillar has been found to affect the capsules also, boring the seeds, but this is unusual and this habit has only been observed hitherto during the winter months. The insect hibernates as a caterpillar from November to February and then aestivates from March to June; it may be in the stem if the plants remain in the field or, if the pods are collected, the caterpillars form cocoons amongst the debris and remain there.

"As regards control, in the case of young plants the removal and destruction of the galled topshoots is necessary and this should reduce further damage(3)."

*L. pseudonectis* occurred in destructive numbers on Sann-hemp (*Crotalaria juncea*) at Sabour in November 1909, and has also been reported as damaging this crop in the Central Provinces and at Surat. The Pusa collection contains examples from Pusa, Coimbatore, Samalkote, Bassein Fort (Bombay) and Peshawar.

At Samalkote it was reared on larvæ on Sann-hemp and at Coimbatore from larvæ on green gram (*Phaseolus mungo*) and on horse gram (*Dolichos biflorus*).

## EXPLANATION OF PLATE XV.

### LASPEYRESIA PSEUDONEOTIS.

Fig. 1. Stem of Oxytalaria juncea bored by larva, showing gall-like swelling.
" 2. Shoot of *O. juncea* bored by larva.
" 3. Larva, natural size and magnified.
" 4. Larva, about to pupate, natural size and magnified.
" 5. Pupa, natural size and magnified.
" 6. Moth, resting attitude, natural size and magnified.
" 7. Male moth, natural size and magnified. (Note black suffusion on dorsal area of hindwing.)
" 8. Female moth, hindwing, showing absence of black dorsal suffusion characteristic of male.

## EXPLANATION OF PLATE XV.

LASPEYRESIA PSEUDONECTIS.

Fig. 1. Stem of *Crotalaria juncea* bored by larva, showing gall-like swelling.
„ 2. Shoot of *C. juncea* distorted by larva.
„ 3. Larva, natural size and magnified.
„ 4. Larva, about to pupate, natural size and magnified.
„ 5. Pupa, natural size and magnified.
„ 6. Moth, resting attitude, natural size and magnified.
„ 7. Male moth, natural size and magnified. (Note black suffusion on dorsal area of hindwing.)
„ 8. Female moth, hindwing, showing absence of black dorsal suffusion characte istic of male.

LASPEYRESIA PSEUDONECTIS.

The full-grown larva is about 12 mm. long, cylindrical, tapering slightly towards either extremity, segments distinct, uniform orange yellow (turning to brilliant red before pupation); head shiny black; prothoracic shield shiny black, divided medially; prolegs equally developed. (Pusa Insectary Cage-slips 397, 1194, 1422, 1422a.)

### LASPEYRESIA TORODELTA, MEYR.

*Laspeyresia torodetta* [misprint for *torodelta*], Meyr., B. J., XXII, 772 (1914)(1); Fletcher, S. Ind. Ins., p. 451, f.329 (1914)(2); Proc. Second Entl. Meeting, p. 56 (1917)(3).

Larva upwards of 10 mm. long, slender, with short hairs scattered over the body, pale green with a reddish head. It bores into the growing tips of *Dolichos lablab*, devouring the tissues of the stem so that this droops and dies. Pupation in larval burrow. Pupal period about 10 days(2).

Recorded from Coimbatore and Malabar in December and January(1, 2).

This species is only known hitherto from Southern India.

### LASPEYRESIA POMONELLA, LINN.

*Tinea pomonella*, Linn., Syst. Nat. ed. X, I, 538 (1758)(1).

*Carpocapsa pomonella*, Spuler, Schmett. Eur. II, 289, t.86 f.54(2) [*et auct. num.*]

*Cydia pomonella*, Wlsm., A.M.N.H. (7), VI, 435 (1900)(3), P.Z.S. 1907, 1006(4).

*Laspeyresia pomonella*, Meyr., P. Linn. Soc. N.S.W., XXXVI, 287 (1911)(5); Proc. Second Entl. Meeting, p. 249 (1917)(6).

The notorious "Codling Moth," which is a most important pest of apples in Europe, America, Australia, and New Zealand, has been recorded from Kashmir (Dras Ladak, 7,000 feet)(3), but does not appear to be known in any of the apple-growing tracts in India. An unidentified Tortricid larva, found boring into apple fruits in Kumaon in August 1918, is certainly not this species. [See page 197, *postea*.]

### LASPEYRESIA PULVERULA, MEYR.

*Laspeyresia pulverula*, Meyr., B. J., XXI, 876 (1912)(1).

Originally described from the Khasi Hills(1), this species has been bred at Dehra Dun by Mr. C. Beeson (1), from *sal* (*Shorea robusta*) collected at Jhafra on 27th January 1916, the moth emerging on 14th March (2); from *sal* log attacked by *Sphærotrypes* and collected in the Jara Range, Pilibhit Division, before 10th April 1916, the moth emerging on 21st May; and (3) from *sal* log attacked by *Sphærotrypes*, collected at Jabbokhet on 9th September 1916, the one moth emerging on 18th October 1916.

PAMMENE ISOCAMPTA, MEYR.

*Pammene isocampta,* Meyr., Exot. Micr., I, 196-197 (1914) (1).

Described from Peradeniya, where it was found "associated with *Lecanium* sp(1)."

PAMMENE THERISTIS, MEYR.

*Pammene theristis,* Meyr., B. J., XXI, 874 (1912)(1); V. S. Iyer, Rept. Bd. Sci. Adv. India, 1909-10, p. 151(2).

Described from Maskeliya and Kumaon(1). Bred from seedlings of *Shorea robusta*(1). Larva attacking roots of one-year old *sal*-seedlings; also in *sal* tfruit; apparently two generations in the year(2).

## CHLIDANOTIDÆ.

The Chlidanotidæ form a small group, with about half-a-dozen described Indian species, of whose life-histories nothing whatever is known at present. The Indian genera contained in this Family are *Archimaga, Chlidanota, Eletracma, Matrernis* and *Trymalitis.* "*Ichthyura*" *argentea,* Butl. (Ill. Het. VI, 24, t.102 f.12; Hmpsn., Moths Ind., I, 176), described from Darjiling, also belongs to an undescribed genus of this group.